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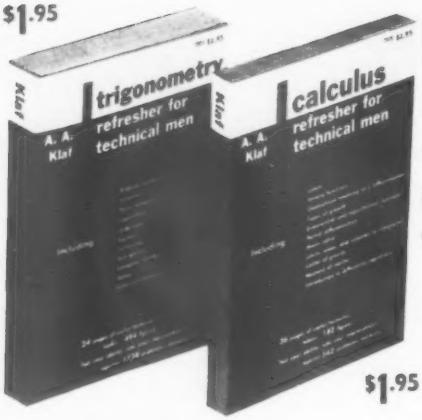

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PHYSICS

New Nuclear Particles

Two nuclear particles, yet undiscovered, are described by Dr. Teller. They would be neutral in charge and possess the properties of energy and momentum.

➤ TWO NEW NUCLEAR PARTICLES and some other ideas about nuclear forces were proposed by Dr. Edward Teller, professor of physics at the University of California, in a lecture at New York University.

The two particles, as yet unnamed and undiscovered, would be neutral in charge and have only the properties of energy and momentum, Dr. Teller predicted.

The scientist said the number of nuclear particles keeps growing and that probably not all of them have been found.

"We probably see only those which because of their relatively greater stability will show up with particular clarity in our experiments," Dr. Teller said.

With only presently known particles, it is difficult to explain nuclear forces satisfactorily, the scientist continued. All of the known particles have some complicated characteristics that do not correspond to the relatively simple behavior of the nuclear forces giving birth to those particles. Nuclear forces are different from any others known, operate over the shortest distances and have the shortest range.

In an effort to overcome some of the difficulties, Dr. Teller and his colleagues have proposed two particles that may be close to the simplest form of radiation. There is no direct evidence for such particles. They are theoretical conceptions based on indirect evidence. In the past other particles, for example, the neutrino, have been proposed on a similar basis. Experiments may demonstrate whether the two particles exist.

The two particles would have such short lives they could not be detected by present methods. They would be neutral in charge. The masses of the particles are undetermined, but they probably would be somewhat heavier than pi mesons and not heavier than K mesons.

The particles would have only the properties of energy and momentum—the minimum characteristics that particles with the properties of light can have.

They would not have the usual particle properties of charge and spin, which are associated with the difficulties found in other particles that are not found in nuclear forces alone.

Dr. Teller proposed some interesting consequences of a nuclear world inhabited by such particles:

1. Neutrons and protons move within nuclei as though they had only half the mass they have in the free state. The changed mass would give a better explanation of nuclear properties.

2. It is possible to propose that pi mesons may be combinations of protons and neutrons and antiprotons and antineutrons. The relatively smaller mass of the pi meson compared to the combined masses of the two particles would result from the surrender of mass to provide enormous binding energy for the complex particle.

3. It is possible more easily to explain why antiprotons have an exceedingly strong attraction for nuclear matter and why the interaction between antiprotons and protons is greater still than the attraction between protons and neutrons.

4. The particles permit a new set of ideas that propose a more satisfactory representation of the distribution of electric charges and currents found in the neighborhood of protons and neutrons.

"The foundation for the new kind of particles which we introduce is indirect and furthermore it is obvious that they are not capable of explaining all observations in high energy physics," Dr. Teller said. "They do, however, introduce greater simplicity in some of the observed phenomena."

Science News Letter, March 30, 1957

● RADIO

Saturday, April 6, 1957, 1:45-2:00 p.m., EST

"Adventures in Science" with Watson Davis, director of Science Service, over the CBS Radio Network. Check your local CBS station.

Dr. Genevieve Stearns, research professor, School of Medicine, State University of Iowa, Iowa City, will discuss "Food for Healthy Children."

VETERINARY MEDICINE

Make Anesthetic Device For Dogs and Cats

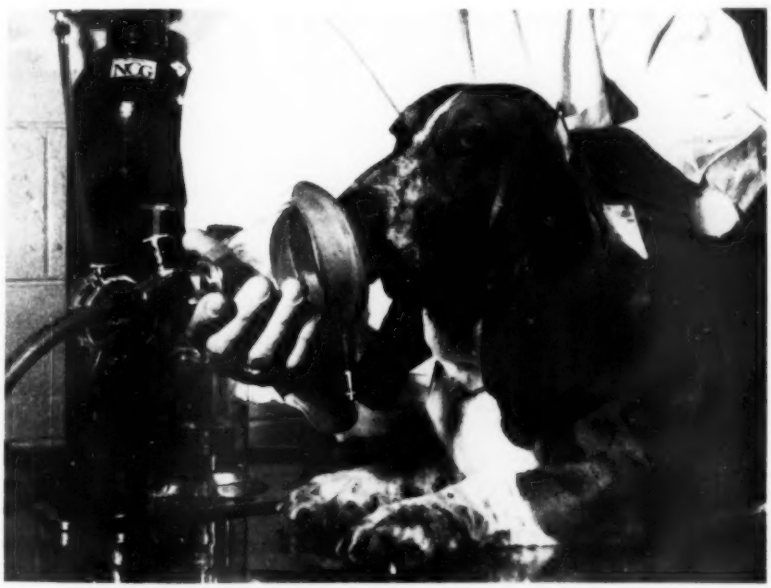
➤ DOGS AND CATS can have the same precision oxygen therapy for surgery and emergency treatment that humans receive, thanks to a device developed for veterinary clinics.

The unit automatically adjusts itself to the lung capacity of a tiny kitten or a large St. Bernard. It will deliver any desired mixture of oxygen and ether during anesthesia, the flow being controlled by a dial. If necessary, the device can be shifted to provide 100% oxygen.

Medical engineers of National Cylinder Gas Co. of Chicago devised the unit to take the guesswork out of small-animal anesthesia.

They said that family pets whose lives might be lost in shock by conventional treatment, administration of barbiturates, have a much better chance of pulling through chest and intestinal system surgery when the device is used.

Science News Letter, March 30, 1957



ANESTHETIC DEVICE—A dog's life has a better chance of being saved, in surgery or accident, with the resuscitator-anesthetizer perfected by medical engineers of National Cylinder Gas Company. With it, small animals can have the same precisely controlled respiration given humans.

SCIENTIA INTERNATIONAL

NOVAS DEL MENSE IN INTERLINGUA

➤ **Psychologia Animal.** — Le principio que animales es incapace a transmitter lor cognoscentias individual a altere membros de lor specie debe esser modificate de accordo con le resultatos de experimentos con rattos reportate per Dr. R. M. Church del Universitate Brown. Post trainar un ratto in un labyrintho a mover se verso un signal de lumine rubie, Dr. Brown poneva un secunde sed non-trainate ratto in le mesme labyrintho e induceva le prime ratto a repeter su acto in le presentia del secunde. Plus tarde le prime ratto esseva removite. Le secunde, lassate sol in le labyrintho, se monstrava alora capace a trovar le signal de lumine sin esser subjicite a un nove curso de trainamento.

➤ **Aeronautica.** — Le projecto de "aerolocomotivas" a propulsion atomic es currentemente studiate per ingenieros del Britannic Ministerio de Provisiones. Tal "locomotivas aeree" pendularea inter le continentes sin atterrage durante plure septimanas. In omne viage transoceanic illos trainarea conventional aeroplanos de cargo que esserea attachate e distachate in volo e que requirerea nulle combustibile pro le viage intercontinental sed solmente pro breve distantias de involamento e atterrage.

➤ **Psychiatria.**—Patientes de morbos mental se distingue per subnormal acuitate de vision nocturne. Iste facto, possibilemente de importantia diagnostic, esseva establite per Dr. G. W. Granger de London qui signala que le phenomeno es simile al effecto producite in le systema nervose per carentia de oxygeno (p. ex. a extreme altitudes) e per excessos de insulina o de alcohol.

➤ **Agronomia.** — Un malherba sud-african, cognoscite como *Striga lutea*, menacia le cultivation de mais e altere granos in le Status Unite. Su prime occurrentia in iste pais ha essite reportate ab le Carolinas. Illo es un semi-parasito, i.e. su semines (de dimensiones microscopic) pote germinar solmente in contacto con le radices de mais e simile plantas gramifere. Plus tarde *Striga lutea* es un planta independente que cresce rapidemente e produce usque a 500.000 semines cata un. Nulle protection contra iste peste es cognoscite. In Africa on lo combatte per destruer afflicte plantationes de grano immediatemente post le germination del malherba. Le secunde plantation de grano in le mesme campo es usualmente libere de strigas (que naturalmente pote re-arrivar le proxime anno). Iste methodo pare economicamente impractic in le Status Unite.

➤ **Medicina.**—Un studio statistic per Dr. W. A. Thomas de St. Louis monstra que in le Status Unite le mortalitate ab morbos cardiac es hodie quasi identic pro homines e feminas. Ante 1940 solmente un tertio del victimas esseva feminin. Le proportion inter blancos e negros moriente ab morbos cardiac es 5 a 1. Iste differentia inter le duo racias pare devenir de plus in plus acute. Dr. Thomas non es preste a acceptar pro illo un explication genetic.

➤ **Transporto Maritime.**—Le currente carentia de naves tank pro le transporto de petroleo ha inspirate un invention britannic que promitte revolutionar le integre campo del transportation transoceanic de liquidos de peso specific inferior a illo de aqua. Le liquidos, specificamente le petroleo, esserea portate in enorme tubos de nylon revestite e reinfortiate de plastico. Iste tubos, possibilemente con un capacitate de 9000 tonnas, esserea trainate in series per naves a vapor traditional. Plenate de petroleo illos esserea submergite a circa quatro quintos. Post lor vacuation al porto de destination le tubos poterea esser rolate in paccos non troppo pesante pro le retro-transporto in aeroplanos. Si iste typo de tank de transporto se prova practic, illo essera cognoscite como NOB, un parola facite ex le initiales del anglese "Nylon Oil Barges."

➤ **Physica Atomic.**—Le studio experimental del comportamento del precipitation radioactive post detonationes atomic ha essite initiate per le Laboratorios Naval de Defensa Radiologic in California. In le experimentos on se servi de un precipitato artificial de lanthanum-140 que esseva seligite a causa de su breve vita medie (de 40.2 horas). In minus ambitiose studios, independentemente executate a Milwaukee, Dr. H. A. Heise ha trovate que le precipitation de pollines super grande citates es impedite per le ascension del aere que es le effecto del levemente elevate temperaturas urban. Ab iste observationes Dr. Heise conclude—e ille lo ha monstrate in experimentos con modellos in miniatura—que in caso de guerra precipitationes radioactive esserea minus periculose pro grande citates que pro areas rural.

➤ **Vitaminologia.**—In experimentos con rattos, Dr. A. E. Axelrod del Universitate Pittsburgh ha trovate que le formation de anticorpore antidiphtheric que es normalmente evocate per injectiones de toxoide de diphtheria remane inadequate quando le subjecto suffre de anormalmente basse reservas de certe vitaminas. Ni repetite injectiones del toxoide ni supplementos de vitamina al tempore del injectiones poteva meliorar le reaction.

➤ **Materiales.**—Le recente reunion del Instituto American de Ingenieros Chimic audiva inter alteres un reporto in re nove projectos e possibilitates in le campo del fibras synthetic (que acquire currentemente inexpectate grados de resistentia a fortias mechanic e a alte temperaturas per le application a illos de energia radiational). On previde un vaste disveloppamento del construction de edificios industrial ex fibras synthetic que es tenite erecte exclusivemente per le mantenentia de levemente elevate pressiones atmospheric a lor interior. On etiam considera le possibilitate de reimplaciar le resortos metallic que supporta le carosserias de automobiles per cossinos de fibras synthetic inflate de aere.

➤ **Cardiologia.** — Un gruppo de medicos de Philadelphia reporta successo in lor effortio de equipar un catheter cardiac con un puncta continente un minusculissime microphono. Assi le nove disciplina medical del phonocardiologia intracardiac es establite. Illo promitte adder considerabilemente al comprension del mechanismo cardiac. Simile effortios esseva initiate in 1954 in Japon. Illos non succedeva a causa del impossibilitate de construer efficace microphonos del requirite microdimensiones.

➤ **Ressources de Energia.**—Algas cresce e mori e descende al fundo del tank. Illos se decompone e produce methano, bioxydo de carbon, e debris organic. Le methano es utilisate como combustibile resultante in plus bioxydo de carbon. Le debris organic e le bioxydo de carbon supporta le crescentia de algas que mori e se decompone e continua iste cyclo que forni un combustibile sin requirer ulle supplemento excepte le energia solar pro le photosynthese del algas. Experimentos laboratorial con iste systema ideal es in progresso al Universitate California.

Science News Letter, March 30, 1957

GENERAL SCIENCE

Reading Interlingua

➤ YOU CAN READ Interlingua if you had no more than one semester of high school French or Spanish or Latin and flunked it. You can read and understand a great deal of it even if you never had contact with any foreign language.

Send this page to an acquaintance abroad and tell him that he can get additional information about Interlingua from Alexander Gode, SCIENCE SERVICE'S Interlingua Division, 80 E. 11th St., New York 3, N. Y.

Science News Letter, March 30, 1957

SCIENCE NEWS LETTER

VOL. 71 MARCH 30, 1957 NO. 13

The Weekly Summary of Current Science, published every Saturday by SCIENCE SERVICE, Inc., 1719 N St., N.W., Washington 6, D. C., NOrth 7-2255. Edited by WATSON DAVIS.

Subscription rates: 1 yr., $5.50; 2 yrs., $10.00; 3 yrs., $14.50; single copy, 15 cents, more than six months old, 25 cents. No charge for foreign postage.

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Printed in U. S. A. Entered as second class matter at the post office at Washington, D. C., under the act of March 3, 1879. Acceptance for mailing at the special rate of postage provided for by Sec. 34.40, P. L. and R., 1948 Edition, paragraph (d) (act of February 28, 1925; 39 U. S. Code 283) authorized February 28, 1950. Established in mimeograph form March 13, 1922. Title registered as trademark, U. S. and Canadian Patent Offices. Indexed in Reader's Guide to Periodical Literature, Abridged Guide, and the Engineering Index.

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BIOCHEMISTRY

How Plants Use Sunlight

➤ A POSSIBLE EXPLANATION of an age-old mystery—how plants build sunlight into the food compounds that maintain life on earth—was proposed in Washington.

Apparently plants have a mechanism similar to that of the Bell Telephone Laboratories photobattery, which is designed to capture sunlight and convert it into an electrical current.

Evidence for nature's "plant photobattery" is presented in *Science* (March 15) by Drs. Melvin Calvin and Power B. Sogo of the University of California, Berkeley.

They suggest, essentially, that bits of plant cells called chloroplasts act as "photobatteries," capturing sunlight and turning it into a kind of electrical current merging with the chemical reactions taking place in photosynthesis.

Dr. Calvin is credited with having charted, in more than a decade of work with radioactive carbon, the complex chemical steps by which plants convert water, carbon dioxide and sunlight into sugars, proteins, carbohydrates and other energy-bearing materials.

With this chemical phase of photosynthesis well on its way, the mechanism by which packets of energy from sunlight entered into the chemical process apparently has been the last major mystery in the process.

Recent studies by other scientists revealed that the chloroplasts, which contain the light-capturing green plant pigment, chlorophyll, have a well-ordered, quasi-crystalline structure, containing alternate layers of proteins, chlorophyll and fats. This arrangement was strikingly suggestive of the photobattery.

Dr. Calvin theorized that a packet of the sun's energy might strike an electron in the chlorophyll, bouncing an electron out and leaving a hole. The electron would then be conducted through the chloroplast, as in a photobattery, until it became attached to a carbon atom participating in the chemical process. Thus energy would be stored in the process.

Meanwhile, the theory suggested, the hole left in the chlorophyll molecule is filled with an electron stolen from an adjacent water molecule. This eventually splits the water molecule into its hydrogen and oxygen components, the oxygen going into the atmosphere and the hydrogen being used as a building material in the photosynthetic process.

Dr. Calvin suggested an experiment to test the idea, and it was first tried by three Washington University scientists, Drs. Barry Commoner, J. J. Heise and J. Townsend.

Essentially, the scientists send a radio-frequency wave through a chloroplast while a light is shining on it and also in the dark. They find part of the wave is absorbed in the light, indicating the presence of free electrons bounced out of the chlorophyll. This supports the theory.

The version of Dr. Calvin's suggested experiment recently completed in Berkeley seems to be the most conclusive. Earlier experiments were conducted at room temperature, where free electrons might arise from chemical reactions in photosynthetic reactions.

Drs. Calvin and Sogo conducted their experiment at the low temperature of minus 140 degrees centigrade, or about 220 degrees below zero Fahrenheit. Since photosynthetic chemical reactions do not take place at this temperature at a measurable rate, the free electrons found to be present can be attributable only to the action of light flashed on the chloroplasts.

Science News Letter, March 30, 1957

GEOPHYSICS

To Study Earth, Seas and Air at MIT Laboratory

➤ THE EARTH, ITS SEAS AND ATMOSPHERE will be studied at a laboratory of earth sciences established at Massachusetts Institute of Technology in Cambridge.

The laboratory, under the direction of Prof. Henry G. Houghton, head of MIT's department of meteorology, is sponsored jointly by that department and the department of geology and geophysics.

Scientists working at the laboratory will attempt a new approach to such problems as whether it is possible to modify the weather on a large scale, what the earth's interior is really like and why continents are distributed the way they are.

Science News Letter, March 30, 1957

PHYSICS

Temperatures Twice Those Of Sun's Surface Reached

➤ TEMPERATURES twice those of the sun's surface are being reached for several minutes by scientists at the University of Chicago. Previously such intense heat could be sustained only for fractions of a second.

A water-stabilized electric arc is used to create temperatures of approximately 25,660 degrees Fahrenheit. The sun's surface is about 11,000 degrees Fahrenheit.

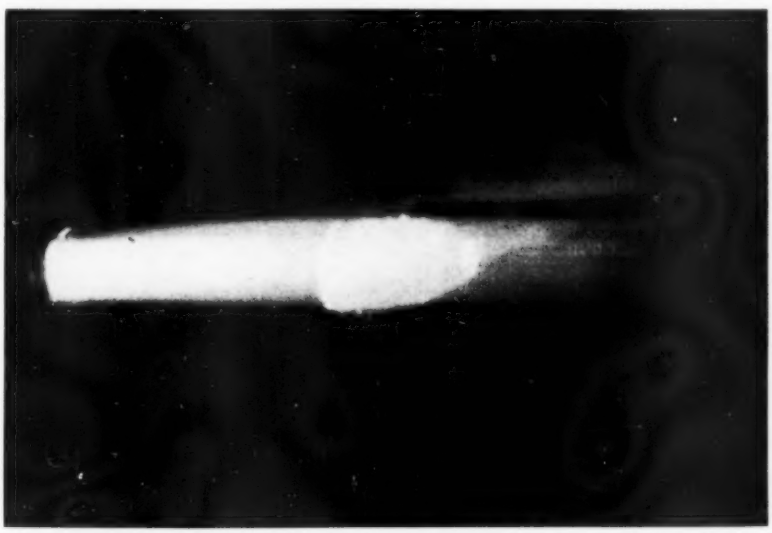
With the high heat, the Chicago scientists are trying to develop new materials for jet engines and hypersonic missiles. They are working on a contract with General Electric Company for the Air Force's Air Research and Development Command.

The arc used differs from a conventional electric arc in that the arc column is controlled by a whirling blanket of water. The water forces the column to stay within prescribed limits. The high temperatures are brought to bear on objects by a plasma stream, flowing at high velocities from the arc through a nozzle in one of the electrodes.

Stabilized arcs were first made in 1904, and the present Chicago set-up is based on designs by R. Weiss, Institute for Experimental Physics of the University of Kiel, Germany.

Dr. T. R. Hogness is director of the Chicago Midway Laboratories where the equipment was developed. Dr. L. Steg is manager of the Aerosciences Laboratory for General Electric.

Science News Letter, March 30, 1957



HEAT TESTS MATERIALS—A plasma stream flowing at high velocities from an arc through a nozzle in one of the electrodes brings the high temperatures to bear on objects.

PHYSICS

Make Synthetic Fallout

➤ SYNTHETIC RADIOACTIVE FALLOUT by the ton has been produced in the laboratory by Government scientists, it was revealed in Philadelphia at the Fifth Hot Laboratories and Equipment Conference.

The man-made fallout has already been used to study ways and means to combat the deadly afterbirth of an A- or H-bomb attack without actually detonating a test bomb, L. W. Weisbecker and W. B. Lane of the U. S. Naval Radiological Defense Laboratory, San Francisco, told the conference.

Up to now, they pointed out, research on decontamination and defenses against "death producing and industry crippling" fallout has been difficult to control and dependent on the fallout produced by a bomb explosion either at Eniwetok or in Nevada.

"To obviate these difficulties," they reported, "methods of producing synthetic fallout in ton quantities have been developed at USNRDL. This synthetic fallout may then be used in carefully controlled decontamination experiments to check the theory and to develop effective countermeasures."

The synthetic radioactive fallout is produced in a "hot" laboratory by processing the radionuclide, lanthanum 140. This was chosen as the tracer material because it is easily detected; has a 40.2-hour half-life, which is long enough to allow some flexibility yet short enough to die out in a reasonable period of time; and is an abundant fission product.

The Navy scientists disclosed that in the fall of 1956 a joint effort by the Army Chemical Corps and USNRDL resulted in an open-field experiment of the synthetic fallout at Camp Stoneman near Pittsburg, Calif.

Three different simulated bomb explosions were tested: underwater, shallow harbor and dry land surface. The experiment, which used mud dredged from the bottom of San Francisco Bay and soil from Camp Stoneman for the bulk carrier of the fallout, required one to two tons of the synthetic fallout per day for 20 days.

The tests, the scientists concluded, were highly successful. They proved to be "quite satisfactory for the job;" were safe for use in the open under field conditions; and make it possible to produce large amounts of synthetic fallout for any sort of experimental study for civil and defense training.

Science News Letter, March 30, 1957

ARCHAEOLOGY

Early Peoples Migrated

➤ GREAT MOVEMENTS of ancient Americans more than 3,000 years ago have been traced by archaeologists, it was announced by the Smithsonian Institution in Washington.

Evidence of the ancient migration of early peoples was found in the distinctive patterns of dishes and pots unearthed by Dr. Clifford Evans, associate curator, division of archaeology, U. S. National Museum; Miss Betty J. Meggers, research associate of the Smithsonian; and Sr. Emilio Estrada, director of the Museo Arqueologico "Victor Emilio Estrada" of Guayaquil, Ecuador.

The oldest pottery found by these scientists in the Guayas Province of coastal Ecuador was identified by them as being of the Valdivia culture. The Valdivia pottery has distinctive traits of finish and decoration that are very similar to the earliest pottery of Mexico and Central America.

Similar pottery has also been found southward in Peru. But the Peruvian examples are not so much like the Mexican ware as is the pottery of Ecuador.

This would indicate, the scientists conclude, that the people traveled southward from Mexico or Central America to Ecuador and then from there to Peru.

The Peruvian examples of the ancient pottery have been dated by the radiocarbon method as between 1500 and 1000 B.C. The Valdivia culture in Ecuador, therefore, must be at least that old, probably considerably older.

Another style of pottery, somewhat more recent than the Valdivia culture, was also unearthed by the scientists. This has been named the Chorrera culture. Like the Valdivia culture, the Chorrera pottery is like that of early cultures in Mexico and also in Peru. But, again, the style is more nearly like the Mexican work than is the Peruvian pottery.

The Chorrera culture also seemed to move from north to south. This culture is dated at from 1000 to 500 B.C.

Still another movement of ancient peoples has been traced by the archaeologists through their distinctive pottery. Excavations on the Rio Napo, a river in eastern Ecuador and a tributary of the Amazon, revealed large villages and a well-developed ceramic art with elaborate vessel forms and complex decoration with incising, painting and designs cut back from the surface. This pottery has close similarities to pottery found on the Marajo Island at the mouth of the Amazon in northern Brazil.

The Marajo pottery is alien to that part of Brazil and seems out of place at the mouth of the Amazon. The new discoveries in Ecuador indicate that this culture originally came from the headwaters of the Amazon tributaries in Ecuador and Colombia.

This is the first time that archaeological evidence has pointed to such an extensive downriver migration in prehistoric times. The movement probably took place a few hundred years before the coming of the Spanish.

When Orellana made his voyage down the Napo and the Amazon in the middle of the 16th century, the sites just unearthed had already been abandoned. He found no Indians living on the Napo within the boundaries of what is now Ecuador.

Science News Letter, March 30, 1957

MINERALOGY

Think "Lost Jade Mines" Of Mexico Located

➤ WHAT has been called "one of the best-kept secrets of our time," may have been tracked down through a clever piece of detective work by Dr. Thomas Clements, curator of mineralogy at the Los Angeles County Museum and head of the geology department at the University of Southern California.

The secret is the location of the rich veins of jade which have provided gem stones for Mexican artists since Aztec times. Dr. Clements is convinced that he has located at least one of the "lost mines" and hopes to uncover the actual site when he returns to the area next July.

The first steps toward hunting down the "lost mines" were taken by the late Dr. Raymond J. Barber, who preceded Dr. Clements as curator of mineralogy at the County Museum. Dr. Barber made an intensive study of ancient Mexican archives, some of which listed the tribute paid to Montezuma by the various provinces of his empire.

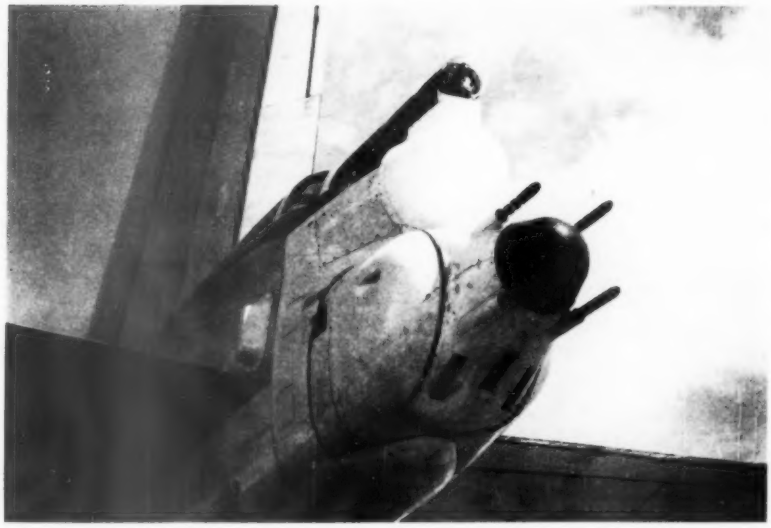
By plotting on a modern map those cities that made yearly contributions in jade, or "chalchihuitl" as it was then called, Dr. Barber identified a narrow belt of some 68 towns. He then compared this belt with contemporary geological surveys of Mexico to find the location of metamorphic rocks where jadeite is most likely to be found.

Following Dr. Barber's death in 1955, Dr. Clements continued his researches. Recently he went on an expedition to Mexico during which he and his wife traveled 10,000 miles in a jeep. They interviewed local Indians, examined specimens, and tracked down countless clues. They finally found specific evidence of a deposit outside Taxco in the state of Guerrero.

Dr. Clements is convinced that the deposits really exist and that some of them are still being worked by modern Indians, who continue to bring in raw stones to the cities for sale to local craftsmen and traders.

"It is more than possible that the jade mines of Mexico were never really lost at all," he concludes, "but are simply one of the best-kept secrets of our time."

Science News Letter, March 30, 1957



GUN WITH RADAR EYES—The gunner on the B-52, with the aid of a TV screen, can sight his guns from the front of the plane while two TV cameras in the back of the plane scan the sky for enemy planes. An electronic "brain" is also used which tells the gunner when to squeeze the trigger. With it only one gunner is needed, whereas formerly six gunners were needed on high altitude bombers.

ENGINEERING

TV Aids Gunner

➤ ONE OF THE LONELIEST flyers in the world will soon be able to join the rest of his crew, thanks to closed circuit television in the B-52, the nation's intercontinental jet bomber.

The lonely flyer is the tail gunner, whose vital job is to man the four radar-controlled 50-caliber tail guns of the B-52, the giant plane's only armament. At present he must spend his flight time completely isolated from the rest of the crew for hours at a time while watching a radar screen that signals him target warning and detection.

But a government contract calls for a redesigning of the B-52's presently used fire control system, shown publicly for the first time by its developer, the American Bosch Arma Corporation, at the Institute of Radio Engineers meeting in New York. The purpose of the new design is to relocate the gunner in a more favorable environment, both physically and psychologically.

It will be done by the use of closed circuit television system which will replace the gunner's eye back in the tail of the plane. He will be moved up forward, near the rest of the crew, and will sight his guns with the aid of a television screen while, in the rear of the plane, two television cameras will continually scan the sky for enemy planes.

The B-52's fire control system uses an electronic "brain" which automatically tracks the oncoming target, figures its speed, distance, and approach, and then tells the gunner when to squeeze the trigger. It is standard equipment on all operating B-52's, the developers said.

Science News Letter, March 30, 1957

PSYCHIATRY

Child Snaps Back From Loss

➤ CHILDREN can snap back after a shattering experience better and quicker than has been supposed.

Results of a study of 38 refugee children, who had lost their mothers and had been transplanted to the United States where they were adopted into Massachusetts homes, were reported by Miss Constance Rathbun and Miss Letitia Di Virgilio, social workers of the Boston Children's Service Association, and Dr. Samuel Waldfogel of the Judge Baker Guidance Center. They presented their report before the American Orthopsychiatric Association meeting in Chicago.

All the children at first felt an emotional shock over the experience of transplantation, some much more severely than others, but most of the children recovered their emotional balance rather quickly with what the scientists called "almost incredible resiliency."

The adjustment was not just on the surface. The children learned English quickly, made good progress in school, formed satisfactory friendships and displayed genuine affection for their new parents.

Of course, the scientists warn, there is still a possibility that if these children face new crises later or suffer new losses of their loved ones, it may reopen the old wounds and undermine their adjustment.

Nevertheless, it looks now as though the child who suffers extreme loss can recover far better than has been expected.

From faraway Israel comes evidence that intermittent mothering does not have long-lasting bad effects on babies. This evidence was reported to the same meeting by Dr. A. I. Rabin of Michigan State University.

Dr. Rabin made a study of babies brought up in the collective settlements (Kibbutz) of Israel.

In these settlements, the infant is placed in an "infant-house" in a room with three or four other babies where he is under the care of a nurse. During the first year, the baby's own mother feeds him. But in the second year even this care is taken over by the nurse. The baby then spends only about an hour a day with his parents. His home is in the "children's house."

Mental tests given by Dr. Rabin to one-year-olds showed that the Kibbutz babies have a lower level of development than have babies brought up in ordinary Israeli villages in the traditional family setting.

Tests of ten-year-olds, however, showed that those brought up in Kibbutz tend to make up the lag and there is even some evidence that they race ahead of the village children in mental development.

Science News Letter, March 30, 1957

PHYSICS

Gravity Shield Would Be of "Dubious Value"

➤ A GRAVITY SHIELD made of particles of negative mass would actually furnish very little, if any, protection from gravity's pull, a top expert on Einstein's theory of relativity reports in *Science* (March 15).

Dr. Peter G. Bergmann of Syracuse University, Syracuse, N. Y., believes that particles of negative mass very likely do not exist at all.

However, giving his imagination full reign, he supposes that particles such as protons but with negative mass might some day be discovered. He further supposes it is possible to put enough of the negative mass particles together to form an object large enough to be seen.

Only if such particles possess an electric charge, Dr. Bergmann concludes, could they be used for gravity shields, but even then they would be of "very dubious value."

Science News Letter, March 30, 1957

AGRICULTURE

Witchweed From Africa Threatens Corn Crops

➤ WITCHWEED, a parasitic plant that attacks corn and other plants of the grain family, threatens to become a serious menace to farmers in this country.

The weed grows to a height of about eight to ten inches and is a native of Africa that has somehow reached the United States. It was found last fall in several counties of North Carolina and adjoining South Carolina, Dr. M. R. Clarkson, Agricultural Research Service, U. S. Department of Agriculture, reported to the House Subcommittee on Appropriations in hearings recently made public.

The witchweed grows from a microscopic seed which germinates only in the presence of the roots of one of the host plants. It attaches itself to the roots of its host plant and draws life from the plant for about three weeks when it emerges above the ground and forms leaves, Dr. Clarkson reported.

The plants seed shortly afterwards and can produce from 100,000 to 500,000 seeds each.

Agricultural officials who studied the plant in Africa liken it to the corn borer in its potential threat to the country's corn crop. No effective control measures have yet been found to keep it from spreading, they emphasize.

In Africa, one method used is planting a trap crop which induces the witchweed to germinate and grow. Then when the weed has come out of the ground, the entire crop is destroyed before the weed has a chance to seed.

"That is a procedure which may be entirely uneconomic to the owner of the land," Dr. Clarkson said.

In the coming season the Department will urge the destruction of all weeds in infested fields to prevent further seeding, he added.

Science News Letter, March 30, 1957

PSYCHOLOGY

Rat Teaches Solution of Problem to Another Rat

➤ A RAT can learn from another rat, or to say it in another way, it is possible for one rat to teach another.

This finding, which is in conflict with the conclusions of many animal psychologists, is reported in the *Journal of Abnormal and Social Psychology* (March), by Dr. Russell M. Church of Brown University in Providence, R. I.

Many psychologists, Dr. Church explains, have believed that animals are unable to learn to solve problems by watching a trained animal perform the trick. It was thought that they could learn only by "trial and error." This means that the animal's native tendency to activity would cause him to move about until he accidentally did the right thing to solve the problem. When the animal touched the right lever, opened the right box, or made the correct turn in a maze, he would receive a reward. After that he would tend to repeat the action which had been rewarded.

Dr. Church found that a rat placed in a maze behind a "leader" who had already learned to make the correct turn to reach the reward of a drink of water, could learn to follow the leader and so obtain the reward.

To make certain that the leader's learning could be transmitted to the follower, a new cue was introduced to direct the leader to the reward. If he turned in the direction of two red lights, he received the reward. In other experiments, the leader had to learn to go to the arm of the maze where the lights were off.

Then the leader was removed from the maze. It was found that the follower rat would act on the light cue in the way that had been learned by his leader.

Science News Letter, March 30, 1957

SURGERY

Plastic Surgical Thread Holds Strength Longer

➤ A SURGICAL THREAD made of Dacron plastic holds its strength longer than presently used materials but unfortunately "remembers" to untie itself automatically, Dr. Raymond W. Postlethwait, professor of surgery, Duke University School of Medicine, Durham, N. C., reported to the American College of Surgeons regional meeting in Washington.

The plastic thread, which gave good results in animal surgery, has a "memory" of the time when it was stretched out straight and, after being left inside the body for two weeks, begins to untie itself. A knot made up of three loops tied in square knot fashion can completely undo itself in that time, Dr. Postlethwait reported.

The study of Dacron was made as part of the continuing search for the perfect suture material to replace catgut, cotton and silk, the three types commonly used today.

Surgeons are looking for a suture material that will combine the good qualities of all three and keep its strength for four weeks inside the body before being absorbed by the surrounding tissues. Although Dacron does not look like the answer, other plastic fibers such as Teflon and Orlon will be tested, the surgeon reported.

Dr. Postlethwait and his associate, Dr. James Schauble, also tried sterilizing surgical thread with radiation from a 3,000,000-electron-volt Van de Graaff generator instead of heat.

On thinner threads the irradiation works well without damaging the fiber strength, but large diameter threads are weakened by it, he reported. The difference is not great but it is a factor that should be studied if irradiation sterilization becomes a common practice, he said.

Science News Letter, March 30, 1957

IN SCIEN

PUBLIC HEALTH

What Happened to All The Polio Vaccine?

➤ ALMOST QUICKER than you can roll up your sleeve the 26,000,000 backlogged doses of polio vaccine have been reduced to nothing and some cities are being forced to postpone their inoculation programs against summertime's biggest crippler.

The shortage was not expected and even if there had been earlier warning signs, it is doubtful whether the drug companies producing the vaccine could have done anything about it.

The underlying reason is that each lot of vaccine takes a total of 140 days to go through all the processes of manufacturing and testing that are required, it was learned from the Eli Lilly Company, Indianapolis, Ind., the nation's largest producer of the vaccine.

As recently as Jan. 1 of this year the huge quantity of perishable vaccine piling up in drug stores and warehouses was a serious problems to the drug companies.

Unlike many other drugs, the vaccine can only be kept for six months before the manufacturer must discard the supply on hand and replace it with a fresh batch.

As late as Jan. 15, the Eli Lilly Company was forced to destroy 27,000 doses of the vaccine because of public apathy in using it, the spokesman said.

Although production was slowed up a bit in the fall, there are now 30,000,000 doses in the Lilly production line which will be available by the end of June. The present situation, in the opinion of the manufacturer, could be better termed a "delay" rather than a shortage.

The skyrocketing public demand for the vaccine has been brought about by the appeals of the American Medical Association, the National Foundation for Infantile Paralysis, the U. S. Public Health Service and other groups. By Feb. 15, the 26,000,000 dose backlog was down to 15,000,000 and has completely disappeared by now.

Dr. Leroy E. Burney, Surgeon General of the U. S. Public Health Service, recommends the following steps for the most effective use of presently available supplies between now and the summer months:

In areas where the supplies are limited pregnant women and persons under 20 should get priority. Communities should begin their programs with first injections as supplies become available, rather than waiting until they get enough vaccine for the second and third shots. Also, planning groups should stagger the dates of their vaccination drives to help even out the available supplies, he said.

Science News Letter, March 30, 1957

CE FIELDS

MEDICINE

Heart Attack Deaths Increase Among Women

➤ SINCE 1940, a startling change has occurred in the number of men versus women who die from heart attacks, Dr. Wilbur A. Thomas, department of pathology, Washington University, St. Louis, Mo., reports in *Nutrition Reviews* (April).

Before 1940 there were two men for every woman victim, but since then women victims have so increased that the ratio is now about one to one, he reported.

This and other unexpected facts were revealed by a study of 17,000 autopsies performed between 1910 and 1954 on victims of heart disease. The study was made to determine the prevalence of acute myocardial infarction, one of the most common causes of death in the United States.

The condition is caused by an inadequate supply of blood to the heart muscle and results in "heart attacks" that usually bring severe pain and disablement. Twenty-five percent to 35% of the victims of these attacks die from them.

Another unexpected finding concerns the difference between white and Negro populations, with five times as many white victims as Negro ones. A difference between the two races was known to exist before, but this latest study showed that the difference is increasing rather than decreasing, Dr. Thomas reported.

He cautioned against attributing it to genetic factors until every other possibility, especially dietary habits, has been exhausted.

Science News Letter, March 30, 1957

MEDICINE

Do Not Despair if You Hear Strange Noises

➤ IF YOU ARE HEARING strange noises even when in a silent room do not despair, Dr. Albert P. Seltzer, assistant professor of otolaryngology, University of Pennsylvania Graduate School of Medicine, Philadelphia, reported in *Today's Health* (March), published by the American Medical Association.

Head noises, known medically as tinnitus, are often more unpleasant than real noises and may start without warning. They may be soft and purring or may sound like wood being sawed or steam escaping from a train shed, the specialist reported.

Deaf people have the highest rate of these noises but they appear in people with normal hearing also. Some hear them when falling asleep, others when in the early stage of anesthesia. The noises can be heard in one ear or both, and to some people they resemble the words of songs.

The causes of tinnitus are as numerous as the types, Dr. Seltzer said.

Unlike normal sound which results from sound waves in the air striking the ear drum, the head noises occur when something else starts the chain events.

Wax or foreign substances blocking the ear canal, middle ear infections, and abnormal passageways between the ear and the throat are sometimes responsible for the noise, he reported.

But you do not have to "grin and bear it" since all of these can be corrected medically, he added.

Science News Letter, March 30, 1957

METEOROLOGY

Dishpan Hurricanes Help Study of Large Storms

➤ MINIATURE HURRICANES made in a dishpan are helping scientists understand the qualities of the large storms, Dr. Dave Fultz and Robert Kaylor of the University of Chicago reported in Chicago.

They told the American Meteorological Society, meeting at the University of Chicago, that the laboratory-produced hurricanes were "similar in many respects" to those so destructive in real life. The models are small whirlpools of water in the pan.

The tiny storms are produced by simulating hurricane conditions—warming at the center, cooling on the outside, and slow rotation. A camera rotating at the same rate, one revolution every two minutes, photographs the patterns made by the red dye and aluminum powder used to trace the water currents. A delicate heat-measuring device called a thermocouple measures the water temperature at various points.

As in real hurricanes, the vortex, or center, of the miniature whirlpool becomes slightly funnel-shaped, surrounded by a fast swirl of water that corresponds to high winds.

As air does in a full-sized hurricane, water rises through the funnel, spreads at the top in a clockwise flow, then sinks to the bottom and returns as a counter-clockwise, or cyclonic, flow.

The tiny, man-made hurricanes are only a ten-millionth the size of the real storms. The 16-inch dishpan represents 500 miles; the two and a half inches of water with which it is filled duplicates, in scale, 60,000 feet of the earth's atmosphere.

A small electric heater in the dishpan's center and a jacket of circulating cold water on the outside rim simulate the temperature conditions of hurricanes.

The laboratory findings are expanded in scale and applied to air masses through mathematical equations.

One unnatural feature, the two scientists point out in their first report of the project, is that the entire model hurricane is surrounded by the pan walls, thus producing a closed circulation system not true of actual storms.

Science News Letter, March 30, 1957

PSYCHIATRY

Mentally Ill Do Not See as Well at Night

➤ MENTAL PATIENTS cannot see as well at night as can normal persons.

The effect of mental illness on night vision is equivalent to putting a smoked glass before the person's eyes, Dr. G. W. Granger, psychologist of the Institute of Psychiatry, Maudsley Hospital, London, said in a report to *Science* (March 15).

Similar effects are produced on night vision by lack of oxygen as in high-altitude flying, by deficiency of sugar in the blood due to insulin and by alcohol, Dr. Granger pointed out.

It seems possible, he indicated, that some of the effects of mental illness may reflect changes in the nervous system similar to those produced by oxygen deficiency, insulin or alcohol. In fact, oxygen deficiency has been reported in psychotics and to a lesser extent in neurotics and one study reported more insulin in psychotic patients under stress than in normal ones.

The findings, he concludes, call for very little revision in accepted theories of visual dark adaptation and night vision. On the other hand, the results may be of much greater interest to psychiatrists and psychologists because they suggest that in the future it may be possible to use tests of night vision as an objective aid in diagnosis of mental ills.

Science News Letter, March 30, 1957

AGRICULTURE

Gibberellic Acid Stimulates Grass Growth

➤ GIBBERELLIC ACID, instead of more fertilizer, may be what your grass needs if it does not grow.

Gibberellic acid is a plant hormone that has been known to the Japanese for 20 years but has not attracted the attention of American and European plant scientists until recently.

Tests of the compound on Kentucky bluegrass show that it can bring growth and color back to the plants within a few days, Drs. Curt Leben, Eli Lilly and Company, Greenfield, Ind., and Lela V. Barton, Boyce Thompson Institute for Plant Research, Yonkers, N. Y., report in *Science* (March 15).

Plots of the blue grass were sprayed with solutions of the acid in October when they were in their slow growth stage. Within four days new shoots had developed and the grass turned a brighter green. After it was cut, both the fresh and dry weights were higher than untreated samples, especially if the plants had been treated with fertilizer as well as the hormone.

The tests show that the acid may be useful for getting grass to grow in the fall and spring, as well as in the winter in warmer climates, the researchers conclude.

Science News Letter, March 30, 1957

ZOOLOGY

The Maligned Octopus

The octopus is not really a vicious monster, but a shy, retiring creature and the most intelligent of invertebrates. Camouflage helps it to avoid capture.

By MARJORIE VAN DE WATER

➤ THE OCTOPUS is known to us chiefly from fantastic tales that picture it as a horrible monster clutching entire ships in its powerful arms and dragging hapless sailors down to a watery grave. It is the octopus, or his close relative the squid, that has inspired the tall tales of sea serpents that are still being reported by newspapers when news is scarce.

Scientists give us a very different picture of this invertebrate creature of the sea. The octopus is described as shy or retiring. He is said to be less likely to attack you and tear you limb from limb than is your own pet dog.

The class of marine creatures of which the octopus is one—the cephalopods (footed head)—is described as the most highly organized and most intelligent of the invertebrates.

The octopus is said to have a larger and better-functioning brain than any other invertebrate and one scientist even suggested that the octopus ranks higher in learning capacity than some of the lower vertebrates.

Has Keen Eye

It has a highly developed eye.

Now a psychologist has taken advantage of this keen eye and the learning ability of the octopus to find out what forms the creature can discriminate readily and which are likely to be confused. From this information, Dr. N. S. Sutherland, of the Institute of Experimental Psychology, Oxford, England, has reasoned what the mechanism of the octopus nervous system must be.

By rewarding the octopus with food at a vertical rectangle and by punishing him with a mild electric shock at a horizontal rectangle, the octopus was trained to attack the vertical and to shy away from the horizontal shape. Reversing the procedure, other octopuses were trained to attack the horizontal and shy away from the vertical.

Scores on this test of discrimination were correct 81% of the trials. The octopuses were even better at learning to distinguish a square from a triangle. The score on this test was 85%.

They are not so clever at distinguishing a circle from a diamond (score 74%). They were poor at telling a T right side up from one upside down. And they failed entirely to distinguish a rectangle that tilted obliquely to the right from one tilted to the left.

From these strengths and weaknesses of discrimination, Dr. Sutherland deduces how perception takes place in the octopus.

First, to answer the question, why is it so easy for the octopus to learn to tell horizontal from vertical figures?

How Distinction Is Made

When the octopus is in movement, his motion is horizontal and his head is held in a fixed orientation by organs called statocysts. But when he is stationary, head movements are usually in a vertical direction.

The excitation produced by an object on the retina of an octopus eye, Dr. Sutherland reasons, is relayed to an array of nerve cells representing a projection of the retina on the optic lobes.

These nerve cells must be arranged in rows and columns. As the octopus swims past a vertical figure, there is no excitation of the cells until he reaches the tall figure. Then there is a sudden burst. The amount of firing from the column cells represents the height of the figure.

The firing of the cells connected with the rows, on the other hand, represents the width of the figure. In the case of the vertical rectangle, this would be a very weak burst.

The nerve pattern, then, for a vertical rectangle would be strong output from columns, with weak output from rows.

Compare this with the pattern for a horizontal rectangle. Here the output is weak for the columns and strong for the rows.

Thus the vertical and horizontal rectangles would look very different to the octopus. The octopus would make its discrimination between the two forms by comparing the size of the output for columns and rows.

If the octopus really does see by this quantitative system suggested by Dr. Sutherland, it explains why such forms as a T right side up and a T upside down could not be readily distinguished. The quantity of nerve cell output would be very similar in both cases. And rectangles tilted in opposite directions would "look" almost identical to the octopus.

"It seems probable," Dr. Sutherland comments, "from the evidence we have that something like the system proposed here may operate in human beings. But in the humans it would almost certainly be only one classifying system operating among several others."

In the octopus, it is enough to account for how this "footed head" is able to learn to seek food at an object of one form and to avoid punishment at another that looks different to it. It explains, too, why the octopus is able to earn an 85% score in the case of horizontal and vertical rectangles, but gets only a 50% or chance score when required to distinguish between the tilted rectangles.

An American psychologist has matched the wits of the octopus against those of the minnow. Dr. Paul N. Schiller of the Yerkes Laboratories of Primate Biology in Orange Park, Fla., found that the octopus as well as the minnow can learn to detour around a glass jar barrier to get at food.

The octopus, however, uses a different method. He reaches out with his long arms (or feet) in different directions until one of them contacts the food. When one arm has found the food, he sends out other arms in the same direction. Then he follows the majority of his arms around the jar to get to the food.

Having learned that the jar is associated with food, the octopus then explores this strange object further. He embraces it. He explores both the inside and the outside. He tilts and lifts it.

Oriental Delicacy

As an article of food, the octopus is repulsive to most Americans. But it is considered a great delicacy by Oriental peoples. Fishermen take advantage of one trait of the octopus to capture it for food.

Far from being a belligerent terror of the

SHY CREATURE — The octopus, scientists find, is no more likely to attack you than your own pet dog. He has a fondness for hiding in holes in rocks and in pottery jars.

deep, the octopus is a shy, retiring creature. He likes to hide in hollows in the rock along the shore.

Fishermen interested in mass capture of octopuses have developed an ingenious system. They lower hollow earthenware pots to the bottom by means of cords. The octopuses enter the pots and make themselves at home. Then the fishermen pull up the pots. The octopus seems reluctant to leave the cosy pot, so the fishermen can pull the pot to the surface before the octopus makes his getaway.

Dr. Paul Bartsch, curator of Marine Invertebrates at the U. S. National Museum, quotes another story to show how the same retiring, shy trait of the octopus has been made use of to capture, not the octopus, but archaeological treasure from the bottom of the sea.

Many years ago, a ship carrying a very valuable cargo of porcelains from Korea was wrecked off Japan, taking the precious pottery to the bottom.

In recent years, fishermen in the vicinity hit upon a way of recovering the pots. They tie strings to octopuses and lower them to the bottom. The octopuses creep into the pots and hang on to them while the fishermen pull them to the surface.

Thus is archaeology indebted to the octopus.

Prototype of Jet Propulsion

The cephalopod is the prototype of jet propulsion.

Water is taken into the mantle cavity between the free edge of the mantle and the body. When the creature is at rest, the water can wash out again through the same opening. But when he wants to move, that opening is closed and the water is driven out with great force through a siphon. This drives the animal backwards through the water at considerable speed.

The octopus and his relatives among the cephalopods have an unusual defense against enemies. A glandular sac produces a dark fluid which the animal can discharge at will.

When the animal is pursued, he can throw out this "ink" as a "smoke-screen" which hides him while he makes good his escape. One scientist has suggested that the ink may serve as decoy or camouflage rather than screen. The ink pool is about the size of an octopus and assumes about the same shape and the enemy may be led to pursue this false octopus while the real one gets away.

This octopus "ink" has its use in printing and photography. It is the sepia that gives the admired brown tone to illustrations.

Science News Letter, March 30, 1957

A four-pound *plastic relief map*, showing South America as it might be seen through a flyer's eyes, is now available.

Adoption of *dry pelleted diets* as standard rations by all state fish hatcheries in Michigan increased trout production (in pounds) by 60%.

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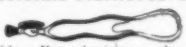

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AERONAUTICS

To Fly Higher, Faster

➤ AN AIRPLANE that will fly higher and faster than man has ever ventured before is being built for the National Advisory Committee for Aeronautics. The research craft is called the X-15.

Details of its design and expected performance are secret, but it will be used to gather information on the problem of reentering the earth's atmosphere and the heating effects then encountered. It will also be used to obtain data on the heating, stability and control of airplanes operating at extreme speeds and altitudes.

These few items on the X-15 were revealed in hearings by the House Subcommittee on Appropriations in Washington. The research airplane is being built by North American Aviation Corporation for the Air Force, to specifications made jointly by the Air Force, Navy and NACA.

Information recorded using the X-15 will be applied to designing hypersonic airplanes and missiles. It is expected to fly in the 7,000 mile-an-hour range.

Highest speed yet attained by a piloted airplane is "well above" two and a half times the speed of sound, which is about 760 miles an hour at sea level. Unofficial reports indicate the plane, the NACA's Bell X-2, reached 2,100 miles an hour at an altitude of 126,000 feet before it crashed last Sept. 27.

Dr. James H. Doolittle, chairman of the NACA, told the committee the reasons for its crash were known, but his explanation of them was taken out of the record for security purposes. The hearings do reveal, however, that instrument records from the plane were salvaged, including one of the "most striking movies" Dr. Doolittle has ever seen.

Photographed by a camera inside the cockpit, he said, were the instrumentation, the pilot's head and his reactions during the entire final flight of the X-2.

In spite of the risk, however, pilots and not electronic equipment will have to be used to fly research airplanes. The reason is that an automatic pilot cannot be installed until it is known what the airplane is going to do.

Science News Letter, March 30, 1957

Books of the Week

For the editorial information of our readers, books received for review since last week's issue are listed. For convenient purchase of any U. S. book in print, send a remittance to cover retail price (postage will be paid) to Book Department, Science Service, 1719 N Street, N.W., Washington 6, D. C. Request free publications direct from publisher, not from Science Service.

ATOMIC ENERGY LEGISLATION THROUGH 84TH CONGRESS—Staff, Joint Committee on Atomic Energy—*Govt. Printing Office*, 166 p., paper, 45 cents. Prepared especially for use of the committee.

ATOMS FOR THE WORLD: United States Participation in the Conference on the Peaceful Uses of Atomic Energy—Laura Fermi—*University of Chicago Press*, 227 p., illus., $3.75. The story of an important event told in informal style by the widow of a renowned atomic scientist.

THE CHEMICAL INDUSTRY FACTS BOOK—*Manufacturing Chemists' Association*, 3rd ed., 149 p., illus., paper, $1.25. History and statistics of the industry and a glossary of terms used.

CHEMISTRY MAGIC—Kenneth M. Swezey—*McGraw-Hill*, 180 p., illus., $4.50. For the home laboratory hobbyist who wants to go beyond the stunts of the ordinary juvenile chemistry book and chemistry set, here are a great many experiments he will enjoy performing.

DEATH OF A MAN—Lael Tucker Wertenbaker—*Random House*, 181 p., $3.50. A woman writer tells how her husband faced death from cancer.

DICTIONARY OF MICROBIOLOGY—Morris B. Jacobs, Maurice J. Gerstein and William G. Walter—*Van Nostrand*, 276 p., illus., $6.75. A reference work defining terms from "Abacterial" to "Zymosan."

GENETICS IN PLANT BREEDING—E. R. Sears and others—*Brookhaven National Laboratory (Office of Technical Services)*, 236 p., illus., paper, $1.25. Report of a symposium held May 21 to 23, 1956.

HANDBOOK OF SOLVENTS: Volume 1, Pure Hydrocarbons—Ibert Mellan—*Reinhold*, 249 p., illus., $6.50. In this field alone there are more than 500 solvents; this work provides information about them.

THE HARVEY LECTURES—J. C. Eccles and others—*Academic*, Series LI, delivered under the auspices of the Harvey Society of New York, 1955-1956, 298 p., illus., $7.50. The text of these important lectures.

HORMONES, BRAIN FUNCTION, AND BEHAVIOR: Proceedings of a Conference on Neuroendocrinology Held at Arden House, Harriman, New York, 1956—Hudson Hoagland, Ed.—*Academic*, 257 p., illus., $7.00. This conference resulted from the renaissance of interest in neuropharmacology because of discovery of drugs that produce experimental psychotic episodes, of tranquilizers and of the effect of hormones on internal environment.

AN INTRODUCTION TO ELECTROSTATIC PRECIPITATION IN THEORY AND PRACTICE—H. E. Rose and A. J. Wood—*Essential Books*, 166 p., illus., $2.80. A critical survey by experts of present knowledge of the subject. Of interest particularly to persons concerned with the problem of air pollution.

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INTRODUCTION TO LABORATORY CHEMISTRY—L. Earle Arnow, revised with the assistance of Marie C. D'Andrea—*Mosby*, 5th ed., 116 p., illus., paper, $1.50. Prepared especially to accompany the author's "Introduction to Physiological and Pathological Chemistry," but useful also with other texts on chemistry or biochemistry.

INTRODUCTION TO PHYSIOLOGICAL AND PATHOLOGICAL CHEMISTRY—L. Earle Arnow, revised with assistance of Marie C. D'Andrea—*Mosby*, 5th ed., 529 p., illus., $4.25. Reference is repeatedly made to practical applications of chemistry to clinical medicine.

JOHN MUIR: Father of Our National Parks—Charles Norman—*Messner*, 191 p., $2.95. The life of a naturalist, geologist, writer and explorer, and one of the first conservationists.

JOSEPH PULITZER: Front Page Pioneer—Iris Noble—*Messner*, 191 p., $2.95. The story of the life of the founder of the St. Louis Post-Dispatch from the time when, as a boy of 17, he swam ashore from the boat that was bringing him to America to "sell" him into the Union Army. He arrived in the new land soaking wet with no money, no friends, no English.

A LABORATORY MANUAL IN HUMAN PHYSIOLOGY—Albert R. Dawe and Robert T. Schopp—*Holt*, 147 p., illus., paper, $2.25. Intended to give the student an opportunity to formulate general principles from his many specific laboratory experiences.

THE LIVING SEA—John Crompton—*Doubleday*, 234 p., illus. with drawings by Denys Ovenden, $3.95. The sea, the author explains, is the source of all our water and living things are composed chiefly of water. This book tells interesting things about the many creatures that live in the sea.

MINERALS YEARBOOK 1953: Volume III, Area Reports—Field Staff of the Regional Mineral Industry Divisions—*Govt. Printing Office*, 1169 p., illus., $4.00. Containing chapters covering each of the 48 states plus chapters on the territories.

MODERN PULP AND PAPER MAKING—George S. Witham, revised and edited by John B. Calkin—*Reinhold*, 3d ed., 549 p., illus., $10.00. A reference book for paper makers.

MUST MEN STARVE? The Malthusian Controversy—Jacob Oser—*Abelard-Schuman*, 331 p., $4.50. Discussing some of the ways by which the world's food supply might be made sufficient to feed all the hungry mouths.

PEACETIME USES OF ATOMIC ENERGY—Martin Mann—*Crowell*, 175 p., illus., $4.50. Describing the uses of this new and powerful tool for health, for industrial power and in research. The author is associate editor of Popular Science Monthly.

PHILOSOPHY OF SCIENCE: The Link Between Science and Philosophy—Philipp Frank—*Prentice-Hall*, 394 p., $7.65. By a distinguished theoretical physicist and founding member of the Conference on Science, Philosophy and Religion.

THE PROSPECTS OF NUCLEAR POWER AND TECHNOLOGY—Gerald Wendt—*Van Nostrand*, 348 p., illus., $6.00. Written for businessmen, legislators and leaders of thought to help them comprehend and evaluate this great new force and what it means to mankind. The author is a writer on science for UNESCO.

PULSE AND DIGITAL CIRCUITS—Jacob Millman and Herbert Taub—*McGraw-Hill*, 687 p., illus., $12.50. An undergraduate text on pulse and digital circuitry in electronic instruments. The circuits and techniques described are basic to an understanding of many diversified specialized fields.

RHEUMATIC DISEASES, RHEUMATISM AND ARTHRITIS—Heinrich G. Brugsch—*Lippincott*, 330 p., illus., $10.00. Written from an internist's point of view and giving complete information about symptoms, prognosis, therapy and possible surgery.

RIGHT-OF-WAY—David R. Levin and others—*Highway Research Board*, Bulletin 140, 83 p., illus., paper, $1.60. Discussing legal and practical problems in connection with the new superhighways, such as billboards, gasoline stations, motels and shopping centers.

THIRD TECHNICAL PROGRESS REPORT—W. L. Faith, N. A. Renzetti and L. H. Rogers—*Air Pollution Foundation*, Report No. 17, 110 p., illus., paper, $3.00. The entire program of the Foundation during 1956 was directed toward extending knowledge of nature, effects and means for control of automobile and incinerator emissions.

THE TRANSMISSION OF PLANETARY THEORIES IN ANCIENT AND MEDIEVAL ASTRONOMY—O. Neugebauer—*Scripta Mathematica*—30 p., illus., paper, 35 cents. Tracing astronomical theory back to its beginnings in the fourth century B.C.

WEATHER ELEMENTS: A Text in Elementary Meteorology—Thomas A. Blair, revised by Robert C. Fite—*Prentice-Hall*, 4th ed., 414 p., illus., $6.75. A text book furnishing basic knowledge on which more advanced study can be founded and also a source of weather knowledge for airplane pilots, agriculturists and others needing to understand the weather.

WHERE THE GODS ARE MOUNTAINS: Three Years Among the People of the Himalayas—Rene von Nebesky-Wojkowitz, translated from the German by Michael Bullock—*Reynal*, 256 p., illus., $4.75. The author is an Austrian anthropologist; his stay in the Himalayas coincided with the time when Tibet was conquered by Red China.

THE WIND AND THE WEATHER—Joe Bolton—*Crowell*, 277 p., illus., $3.95. Telling why the weather man is sometimes wrong in his prediction and why he is so often right. The book also gives ancient lore and modern knowledge about weather and weather forecasting.

GENERAL SCIENCE

Science Foundation Head Gets First Conrad Award

➤ DR. ALAN T. WATERMAN, director of the National Science Foundation, is the recipient of the first annual Captain Robert Dexter Conrad award.

The award, established by the Office of Naval Research, is made in recognition of outstanding technical and scientific achievements in research and development for the Navy.

It was presented to Dr. Waterman by Dr. Allen V. Astin, director of the National Bureau of Standards.

The award is named for the first head of the planning division of the Office of Naval Research.

WILDLIFE

House Wren Returns To North for Summer

See Front Cover

➤ A WELCOME SIGN OF SPRING is the arrival of the little brown house wren from his southern winter vacation. The wren, shown on the cover of this week's SCIENCE NEWS LETTER, reaches the Washington, D. C., area around the first of April; ten days later it reaches the environs of Philadelphia while another ten days are needed for it to reach New York.

The first task to be accomplished is the building of the nest for the summer home. Later the female lays six to eight pinkish chocolate-spotted eggs that soon hatch into a nestful of hungry fledglings.

The wrens are desirable tenants as they swarm over the tree where they build their nest, devouring spiders, caterpillars, beetles, cutworms, weevils, ticks and plant lice in huge amounts.

Science News Letter, March 30, 1957

METEOROLOGY

Tritium Can Help Chart Water's Circulation

➤ AN H-BOMB INGREDIENT, the triple-weight hydrogen known as tritium, can be used to chart the world's water circulation, the American Meteorological Society meeting at the University of Chicago was told.

A sharp increase in tritium concentration is one method by which scientists detect hydrogen bomb explosions anywhere in the world.

Dr. Friedrich Begemann of the University of Chicago's Enrico Fermi Institute for Nuclear Studies said tritium makes an "excellent atmospheric tracer" because it acts with oxygen to form water. Tritium's radioactivity is easily detected for about 12 years, and is too low to pose a health hazard.

In nature, tritium is thought to be produced by cosmic ray bombardment of air and by direct emission from the sun. After the first Operation Castle H-bombs were exploded three years ago this spring, the world's tritium content doubled.

There is now an average of a million of these atoms among the trillion trillion atoms in each cubic centimeter of water.

Because of the secrecy surrounding Operation Castle, Dr. Begemann said, scientists missed a good opportunity to study worldwide weather patterns, since the tritium stayed in the atmosphere 40 days before dissipating to ground and ocean waters.

Dr. Begemann has been able to use the tritium concentration to study the water circulation rates for the northern Mississippi Valley. He found that 52% of ocean water vapor rains out by the time it reaches Chicago.

His studies also showed that the average rain over Chicago is composed of two-thirds ocean water vapor and one-third reevaporated ground water.

Tritium was discovered in nature in 1951 simultaneously by Dr. Willard Libby, University of Chicago chemistry professor now on leave as a member of the Atomic Energy Commission, and Profs. Faltings and Hartech in Germany.

Science News Letter, March 30, 1957

Questions

ARCHAEOLOGY—When did great movements of ancient Americans occur? p. 198.

☐ ☐ ☐

BIOCHEMISTRY—What part of the plant acts as the "photobattery"? p. 197.

☐ ☐ ☐

PHYSICS—How is synthetic radioactive fallout produced? p. 198.

☐ ☐ ☐

PUBLIC HEALTH—Why is the nation faced with a shortage of polio vaccine? p. 200.

☐ ☐ ☐

ZOOLOGY—Which is the most intelligent of the invertebrates? p. 202.

☐ ☐ ☐

PHOTOGRAPHS: Cover, George A. Smith; p. 195, National Cylinder Gas Co.; p. 197, University of Chicago; p. 199, American Bosch Arma Corp.; p. 202, American Museum of Natural History; p. 208, National Carbon Co.

THE ENJOYMENT OF MATHEMATICS

By Hans Rademacher & Otto Toeplitz

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MEDICINE

Pill-Making Machine

➤ A PILL-MAKING MACHINE that is foolproof and can turn out 1,000 compression-coated tablets per minute may lead to major changes in the industry. It is being developed by scientists at the University of Michigan College of Pharmacy.

The machine uses a process called compression coating, introduced on a large scale about five years ago with machines that could stamp out 400 pills a minute. In the process, the active ingredient core of the pill is put between two dies that press the coating around it. It then becomes a pill within a pill.

However, up to now there has been one serious drawback to the process, the lack of a foolproof way to tell if there is actually a core inside the coating.

Two methods of inspection tried are adding either iron or a material opaque to X-rays to the core. Then the finished products could be inspected with either an X-ray machine or a magnet.

Both of these methods have run into opposition and it was found that some people could not tolerate the iron, Dr. Albert Mattocks, professor of pharmacy, reported.

The new machine uses suction tubes to pick up the cores and transfer them to the compression chamber. If the tube fails to pick up a core, no outside coating is compressed and therefore there is no need for inspection, he said.

The older and most common technique for pill making is called pan rolling. The pills are revolved in deep pans and covered with a wet mixture of their outside coatings. This method insures adequate coating, but is a long process and wastes considerable material, Dr. Mattocks reported.

Another drawback is that some drugs are damaged by the amount of heat needed in pan rolling. Penicillin is one of these and was one of the first of the newer drugs to be compression coated, he said.

The pill-making machine was built by the Colton Company of Detroit, Mich.

Science News Letter, March 30, 1957

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ENGINEERING

Lifetime Nuclear Battery Uses Isotopes

➤ DESIGN of a practical "lifetime" power source for electronic equipment that uses the heat from radioactive isotopes to generate electric current was reported by J. L. Briggs, Rome Air Development Center, Griffiss Air Force Base, N. Y., to the Institute of Radio Engineers meeting in New York.

The heat generated as the radioactive isotope decays, or loses its radioactivity, is used to drive a semiconductor "thermopile," Mr. Briggs reported. This is a transistor-like device that can produce electrical energy when heated by the isotope's decay.

The thermoelectric generator is a rugged and stable sealed-in power source that can last up to 30 years, Mr. Briggs said.

Science News Letter, March 30, 1957

Do You Know?

In a special kitchen exhibit, the kitchen floor is cleaned by a mobile floor cleaner functioning automatically; dispatched by remote control, the *"mechanical maid"* disappears into a base cabinet recess when the scrubbing job is done.

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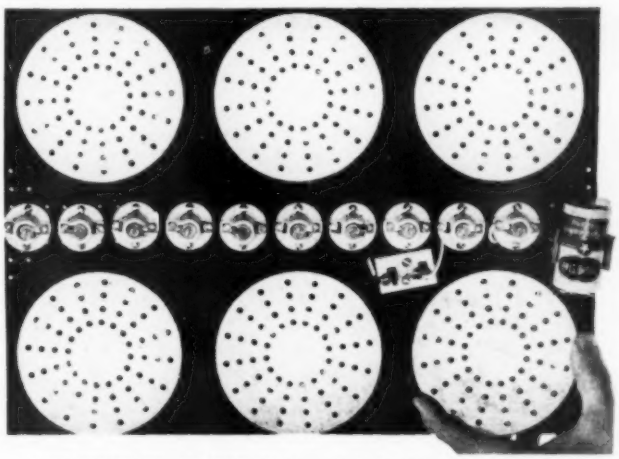

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For sources of more information on new things described, send a self-addressed stamped envelope to SCIENCE SERVICE, 1719 N St., N.W., Washington 6, D. C., and ask for Gadget Bulletin 876. To receive this Gadget Bulletin without special request each week, remit $1.50 for one year's subscription.

REMINDER TIMER for light sleepers, laboratory technicians, photographers, cooks and parking meter worriers clips on to a pocket. The size of a wristwatch, the timer sounds off with a buzz when a specified time arrives. It can be preset for five minutes up to four hours.

Science News Letter, March 30, 1957

GLASSWARE JOINTS for laboratory use are described as more economical than ground joints, corks or rubber bungs. Unground, the British-made joints of glass are flexible and interchangeable. Fit is achieved by the compression of flexible rings between the cone and the socket.

Science News Letter, March 30, 1957

PLUG LOCK is designed to protect children from using electrical appliances. The device is locked over the tines of any ordinary male electric plug, and in this way, prevents the use of the entire electrical appliance by either tots or unauthorized persons.

Science News Letter, March 30, 1957

EMERGENCY LANTERN for motorists, outdoorsmen and indoorsmen is housed in an aluminum case. The lantern, shown in the photograph, has an aluminized reflector, unbreakable lens and carrying handle.

The push-button switch is designed so that it cannot be turned on accidentally. Made to fit in the glove compartment of a car, the lantern's one-piece seamless casing is corrosion resistant and virtually indestructible.

Science News Letter, March 30, 1957

GAS INCINERATOR is designed to look like other home appliances. The gas-fired trash remover has a safety shutoff device, automatic timing for the burning cycle, and a loading door that is operated by a foot pedal. Smoke and odors are drawn into the unit's chamber for re-burning before being sent up the flue.

Science News Letter, March 30, 1957

DENTAL TOOLS for factories, shops and laboratories can be used for manipulating, manual sensing, guiding, lubricating and selecting. Unit-forged of stainless steel, the tools have multiform needle ends and nonskid handles.

Science News Letter, March 30, 1957

FIREPLACE TONGS use the scissor principle to make it easier to lift heavy logs. The 26-inch-long tongs have flat handles and two points on each blade to help keep the log from twisting. The tongs are available in a brass, black or cadmium finish.

Science News Letter, March 30, 1957

HIDDEN PLUMBING combines a reverse-trap bowl and concealed tank that can be installed in any six-inch wall. Described as the first such unit for residential use, it is designed to operate quietly and requires no special drain pipe. The closet is available as a complete package.

Science News Letter, March 30, 1957

Nature Ramblings

By HORACE LOFTIN

➤ THERE is no question about it: the armadillo looks like a creature from another world. A science-fiction writer might have created such an unlikely creature to describe the fauna of a lost planet.

This odd mammal with its coat of mail, undersized triangular head, rabbit ears, armored tail and sharp claws may "look like" he does not belong, but consider this: he is quite a successful animal. Not only is he holding his own in the animal world, but he is extending his range.

For a long time scientists thought that our single American species, the nine-banded armadillo, was only a casual visitor into southern Texas from Mexico. Later it became evident that this animal had taken up residence in Texas. Still, he was thought of as "exotic," and textbooks appearing in the 1930's stated that his range was limited in the United States to southern Texas.

The Improbable Armadillo

In spite of statements in textbooks, the nine-banded armadillo would not stay put, and the newer books — trying to keep up with the armadillo's progress—tell another story. Today this creature is commonplace in much of Louisiana. Armadillo populations are beginning in Alabama and Mississippi and perhaps other contiguous states should be added to this list.

Florida can boast the presence of a considerable number of armadillos in scattered areas of the state, but these apparently are the descendants of animals that escaped from captivity. Their distribution is too discontinuous for them to represent migrants from along the Texas-Louisiana-Alabama route. Perhaps some day there may be a family reunion when armadillos wandering in from the west meet their relatives who are already established in Florida.

One last note on these improbable animals: father armadillo is never surprised when mother armadillo presents him with quadruplets. She always has quadruplets!

This occurs because the single fertilized egg of the armadillo invariably divides to produce two pairs of identical twins. And since they are all identical twins, of course all four young of a litter are of the same sex.

Science News Letter, March 30, 1957